Honolulu Community College
General Education – DIVERSIFICATION DESIGNATION
Certification and Recertification
Application Form
Spring 2012

APPLICANT: Richard Brill

E-MAIL: brill@hawaii.edu

COURSE ALPHA and NUMBER: GG 101

COURSE TITLE: Introduction to Geology and Geophysics

ESTIMATED NUMBER OF SECTIONS:
   Fall: 1
   Spring: 1

APPLICATION IS FOR:
   □ New Course   □ Modified Course   x Existing Course   □ Re-designation
   □ Certification □ Re-Certification. Date of last certification:

DIVERSIFICATION AREA DESIGNATION SOUGHT:
   □ DA (Arts)                                           x DP (Physical Sciences)
   □ DB (Biological Sciences)                            □ DS (Social Sciences)
   □ DH (Humanities)                                     □ DY (Laboratory)
   □ DL (Literature and Language)

What percentage of the CONTENT of this course focuses on this diversification area? 100

What percentage of CLASS MEETINGS focuses on this diversification area? 100
1. **Hallmarks and SLOs.** Please explain how course-specific SLOs align with the diversification area’s hallmarks.

For ease of comparison the SLOs will be referred to by number in the explanations below. The SLOs as listed in the syllabus are as follows:

1. Describe the major postulates of geological studies.
2. Describe the main features of the ocean floor and their relation to geologic processes.
3. Understand Earth's interior structure and the ways which are used to investigate it.
4. Relate various geologic processes to a global model.
5. Understand how mountains are built as continents grow over time.
6. Demonstrate understanding of the vastness of geologic time, the evolution of life and the ways we learn about them.
7. Describe the features of earthquakes and associated waves.
8. Explain the rock cycle and its relevance to understanding geological processes.
9. Describe the compositions and structures of matter, minerals, and rocks.
10. Describe the origin, nature and variety of igneous processes and products.
11. Demonstrate understanding of weathering, soil formation and erosion.
12. Be familiar with the processes, features, and environments of sedimentation and sedimentary rocks.
13. Demonstrate understanding of the chemical and physical processes of metamorphism.
14. Demonstrate understanding of the dynamics and equilibrium of streams and groundwater movements.
15. Demonstrate understanding of the evolution of the landscape through the action of gravity, water, waves, wind, and ice.
16. Demonstrate understanding of the nature of mankind's problems and attitudes concerning geologic hazards and resources.

A list of course topics is at the end of the syllabus. The topics focus specifically and 100% towards the SLOs.

**DP.1 Use the terminology of the physical sciences;**

Geology is a very descriptive science, and virtually all SLOs involve terminology, much of which is unique to geology. Specific examples follow:

SLO 1 requires the student to use geological terminology to describe uniformitarianism, original horizontality, cross-cutting relationships, stratigraphic age relationships.

SLO 2 requires the student to use the correct terminology to describe the major features of the ocean floor such as continental shelf, continental slope, continental rise, abyssal plains, seamounts to list a few.

SLO 3 requires the student to use the correct terminology to describe the earth's interior and the ways used to investigate it. This includes the structure of the earth from oceanic and continental crust, mantle, core, and also the asthenosphere and lithosphere.

SLO 7 requires the student to use the correct terminology to describe the types of earthquake waves and the motion associated with them.

SLO 8 requires the student to use the correct terminology to name the components of the rock cycle such as the 3 rock types (igneous, metamorphic, sedimentary) and the processes that connect them (melting, crystallization, weathering, erosion, and deposition, lithification, and metamorphism.

SLO 10 requires the student to use the correct terminology to name igneous rocks such as granite,
andesite, basalt, and the types of volcanic and plutonic structures such as shield and composite volcanoes, cinder cones, batholiths, dikes.

SLO 12 and SLO 13 require the student to use the correct terminology to name and identify a variety of types of sedimentary rocks (clastic and nonclastic) and metamorphic rocks (foliated and nonfoliated)

SLO 14 requires the student to use the correct terminology to name and identify aspects of stream dynamics such as gradient, erosive ability, meanders, et. al.

**DP.2 Identify the knowledge and theories relating to processes in the physical sciences**

SLO 1 lists the major axioms of geologic studies. List is expanded in DP.1

SLO 3 refers to plate tectonics and the way in which it revolutionized geology beginning in the 1960s

SLO 4 studies the way the continents grow by accretion at the edges as mountains are built according to plate tectonics theory

SLO 3 examines the way in which earthquake waves, rare mantle rock samples and meteorites are used to understand earth’s internal composition and structure

SLO 6 examines how theories of the history of the earth have changed and the methods used to ascertain it

SLO 8 uses atomic theory to show how mineral and rock composition and structure determines their properties

SLO 10 examines the process of magmatic differentiation to explain how differing compositions of magma arise from a single parent magma

SLO 11 and 12 examine the chemical and physical weathering processes and metamorphism in terms of equilibrium and chemical reactions

**DP.3 demonstrate an understanding that inquiry involves observation/experiment and reasoning and mathematics**

SLO 3 relies upon inductive and deductive reasoning given certain chemical and physical data about the earth, earthquakes, meteorites, and solar system data to piece together earth’s structure

SLO 4 studies how plate tectonics came to be accepted as a global unifying model for understanding the earth

SLO 9 relies partially on balanced chemical reactions

SLO 10 uses Bowen’s reaction series to understand magmatic differentiation based on empirical studies on the laboratory of mineral phases in igneous rock analogs

SLO 14 uses D’Arcy’s Law to calculate ground water movement.

Geology is by nature an empirical science that is based on mathematical principles of chemistry and physics. Mathematics is qualitative and illustrative in introductory courses and very little calculations are performed except in the laboratory. See accompanying GG101L documents for specifics.

2. **Assessment strategies** Explain assessment strategies you have used (or plan to use) to measure the degree to which students exit the course with the course-specific SLOs. If there are multiple sections of the course taught by different instructors, please discuss how assessment is (or will be) carried out across instructors.
1. Students take comprehensive exams that are specifically matched to each SLOs by item. Students are presented with randomly chosen questions each of which is created from the appropriate, SLO(s). All SLOs are covered by the set of questions. Questions are compartmentalized by topic so that each student is assured of getting the same number of questions on a given topic and a given SLO.

2. Each student presents a report on a self-guided field trip to a location of their choosing. The report must include a description of the geologic feature being reported on. The report is graded subjectively and assessed on whether the report as a whole exemplifies an adequate incorporation of SLOs for the chosen topic.

3. **Assessment of assessment.** How have you used (or plan to use) the assessment findings to modify or improve this course? If there are multiple sections of the course taught by different instructors, please discuss how review of assessment results is (or will be) carried out across instructors.

   Objective questions are 80% of the assessment. Exams are item-analyzed after each administration and questions for which overall performance is poor are rewritten or discarded. Additionally new questions are added each semester and analyzed in subsequent semester. This dynamic process attempts to remove ambiguities in both questions and answers. The instructor’s knowledge of which topics have been the most difficult help to guide current students through the more esoteric parts of the course.

   The field trip report is 20% of the assessment. Although graded subjectively it provides a direct measure of each student's learning on a self-chosen topic. Instructor compares random samples of reports with previous reports and grades to help in determining uniformity and continuity. Students are coached en masse to use critical thinking to solve recurring problems.
DIVERSIFICATION BOARD DECISION:

☑ Approved
Re-Certification Due: Fall 2017

☐ Not approved
If not approved, reasons for disapproval:

Diversification Board Chair Signature: Jenny
Date: 10/28/12
Honolulu Community College GG 101 Course Syllabus

INSTRUCTOR: Richard Brill, Professor
HOURS: Online by appointment
Contact: Laulima

IMPORTANT: Special Notes

1. Page numbers and graphics references in the current edition of the text and study guide are different from those cited in the TV programs. Chapter numbers are the same so it should not be difficult to find the pages cited.

Contact the instructor at Laulima if there are questions or problems.

2. Each student must contact the instructor via e-mail no later than midnight of the day of the first scheduled broadcast of Program 3. See the broadcast schedule for the date.

Leave a message on Laulima for contact.

Any student who has not responded by that date and who does not officially withdraw may receive a failing grade for the course.

Exams and other course materials will be sent via UH e-mail.

GENERAL INFORMATION

Read this syllabus carefully. It is your first reading assignment.

It contains important information about the course that will help you to learn the material and to receive a better grade. Each student is responsible for the material in this syllabus.

Be sure you understand the requirements for the course, and be sure you keep the goals and objectives in mind as you proceed through the
course. It is a good idea to look at them every now and then to remain focused and to keep the course in perspective.

It is impossible to meet the student learning outcomes if you do not know what they are.

Specific information regarding exams and course procedures will be e-mailed to all registered students early in the course.

To receive a grade for the course you must complete 4 exams and a field trip report. Information about the required self-guided field trip can be found here in this syllabus.

TEXTBOOKS and REFERENCES

Physical Geology: Earth Revealed by Carlson, McGeary and Plummer.

Check with bookstore for current edition:

Earlier editions are OK to use, although page numbers, illustrations, and special features will be different.

Telecourse Guide For Earth Revealed: Introductory Geology by Intelecom/Ruth LeBow

Check with bookstore for current edition

Required textbooks are available from the HCC Bookstore, or they can be ordered online from the UH bookstore. See the information you received at registration for further information.

A list of selected library references is available which may enhance your appreciation of geology and Earth.

The links page has hot links to various internet resources concerning geology.

Libraries have books of many kinds on geology. Ask the librarian for help in locating the geology section. Additional references are also listed in the Field Trip Report section near the end of the syllabus.

COURSE DESCRIPTION

GG 101 is the study of Earth, man's physical environment, landscape, rocks and minerals, rivers and oceans, volcanoes, earthquakes, plate tectonics and other internal processes; the effects of man's actions on Planet Earth. A list of topics is at the end of this syllabus.
Successful completion of this course satisfies the physical science (DP) requirement for the natural science area requirement for Honolulu Community College's General Education Core.

GOALS & STUDENT LEARNING OUTCOMES

Goals

1. Use analytical and logical reasoning and to develop pictorial intuition.
2. View Earth as a planet as an integrated system of physical, chemical, and biological processes attempting to attain dynamic equilibrium.
3. Appreciate the unity of materials and processes among the earth, planets, and stars.
4. Appreciate the uniqueness of Earth as a planet, and as an environment.
5. Appreciate the meaning and dimensions of geologic time and the effects of slow rates of change.
6. Understand the geological methods and human insights by which knowledge of Earth has grown.

Student Learning Outcomes

After completing this course you should be able to:

1. Describe the major postulates of geological studies.
2. Describe the main features of the ocean floor and their relation to geologic processes.
3. Understand Earth's interior structure and the ways which are used to investigate it.
4. Relate various geologic processes to a global model.
5. Understand how mountains are built as continents grow over time.
6. Demonstrate understanding of the vastness of geologic time, the evolution of life and the ways we learn about them.
7. Describe the features of earthquakes and associated waves.
8. Explain the rock cycle and its relevance to understanding geological processes
9. Describe the compositions and structures of matter, minerals, and rocks.
10. Describe the origin, nature and variety of igneous processes and products.
11. Demonstrate understanding of weathering, soil formation and erosion.
12. Be familiar with the processes, features, and environments of sedimentation and sedimentary rocks.
13. Demonstrate understanding of the chemical and physical processes of metamorphism.
14. Demonstrate understanding of the dynamics and equilibrium of streams and groundwater movements.
15. Demonstrate understanding of the evolution of the landscape through the action of gravity, water, waves, wind, and ice.
16. Demonstrate understanding of the nature of mankind's problems and attitudes concerning geologic hazards and resources.

Objectives for each lesson are in the required study guide. They are available online as on screen html or pdf.

INTRODUCTION

This college level science course is designed to help you understand our planet and the processes which are responsible for its evolution. Earth is an active and dynamic planet where change is the natural state of affairs. The landscapes and topographic features that we see today are the result of those processes. Geology is the study of the materials, processes and features of Earth.

There are three main areas to the study of geology. These are surface processes, internal processes and materials. Geologists use their knowledge of these areas to study all aspects of our planet and its neighbors in
NATURAL CURIOSITY

Did You Ever Wonder...?

It is natural that we should be curious about our planet. Except for energy from the sun and an insignificant amount of space debris our home planet is self-contained. All of the materials we need for life and civilization come from the Earth beneath our feet, and all of the materials we use are ultimately returned there. Most, if not all of the atoms of all substances on Earth have been here since the birth of the planet more than four and one-half billion years ago. Earth is the only planet we can touch. We can examine it directly. It is the only one most of us are ever likely to visit. It is our home, and a good one at that.

Have you ever wondered why there are mountains and valleys, rivers, oceans and volcanoes, and why they are where they are? Where does the water in rivers come from? Why do earthquakes happen? Why do oil and minerals occur in some places and not in others? Why is there sand on a beach and where does it come from? Why is the landscape the shape that it is? Where do rocks come from and why are there so many different kinds? Geologists look for answers to these and other questions by collecting data in the field and analyzing it in the laboratory. Using the results of these investigations to model Earth and its processes we have slowly come to understand the way Earth works.

Geologic Time is Slow By Human Standards

Geological processes operate slowly. They cause changes which occur imperceptibly on the human time scale but produce significant results over the long spans of geologic time. The vastness of geologic time is impossible to comprehend, but the concept ranks as one of the more significant contributions made by the science of geology. With a concept of the large amount of time available, geologists apply a few simple methods and the logic of induction and deduction to understand the processes, materials, agents and history of the ever changing Earth.

Universal Processes Shape the Earth

Although Earth is unique among planets, it is subject to the general laws of chemistry and physics as the rest of the universe. Earth is made of chemicals and it is shaped and influenced by chemical, physical, and biological processes. In fact, it is made mostly from only a few different chemical elements and shaped mostly by only a few simple processes. These processes produce a unique environment on Earth because of its composition, the location of its orbit, and the presence of liquid water and life. Add to that Earth’s dynamic interior and you have a complex and changing planet. A few simple rules and a little common sense are all that is needed to understand how it works and allow us to see it from a very different perspective.

The Earth is Large and Difficult to Study

Although only medium sized as planets come, Earth is large on a human scale. In fact, it is so large that any one person can see only a small fraction of it’s surface in a lifetime, and none of us will ever see deep into the interior. Yet in just two hundred years of systematic study an impressive amount of information has been gained about the materials, processes, and relationships both on the surface and deep within Earth. In the past thirty years we have finally been able to put the pieces of the puzzle together and have begun to understand the big picture.

Geologic Eyes

One of the primary goals of this course is that each student will develop a new appreciation for Earth
which will result in a new perspective. When you are in your favorite spot on the beach, in the mountains, in a boat, or looking out the window from your easy chair, we hope you will see the Earth around you differently. When you visit the volcano, fly across the continent, walk on the beach, or drive across the Koolauus, you see the results of processes which have been shaping our Earth since the beginning of time. The processes are the same everywhere, but they operate at different rates in different places.

By understanding how our planet works we satisfy our natural curiosity, increase our appreciation, and increase our awareness of its fragility and the importance of careful stewardship of its systems and resources.

METHOD OF INSTRUCTION

Geology is a visual subject so the course relies heavily upon visual materials. The intent of lectures is to explain concepts, annotate photographs, organize information and highlight certain topics. Class participation through questions and discussion is encouraged.

Reading and Studying the Text and Study Guide

The primary source of information is the text. You cannot expect to do well in this course simply by attending lectures. You will also need to read, think, analyze, and synthesize. It might be helpful to think of the classroom as a supplement to the text.

Independent Study

College courses require a significant amount of independent study, away from the classroom). You should be willing to devote a minimum of two hours outside of class for each hour in class listening, looking, reading and thinking about what you have heard, seen, and read. There is much more to learning than simply knowing a collection of facts, and in the study of geology it is tempting to let the facts get in the way of understanding. There is far too much information for anyone to learn it all, especially in an introductory and descriptive course such as this one.

Synthesize, Analyze, Evaluate

For this reason, an important goal in college courses is for each student to acquire the ability for self-directed learning, and the ability to handle information from a variety of sources: extract the essentials, organize and process it, and synthesize what you have learned. Learning involves assimilating new information with your own experiences and goals. To master this course material you will need to make connections, see relationships and analyze information. You will need to reason logically, as well as to know the facts and the vocabulary. You cannot just memorize a series of facts in this course. This is why a combination of activities is required.

Stay On Schedule

Falling behind is a sure way to lose interest and do poorly on the exams. Careful reading of each chapter will require several hours. Although there is no one way of learning which works best for everyone, the text contains a variety of learning aids. You will find summaries of terms, boxes with special topics, end-of-chapter questions, summaries of each chapter, appendices, an index, and a glossary. Taking a few minutes to find each of these will improve your interactions with the text.

Learn to Take Good Notes

You may try to take notes as you watch the videos. If you do, be aware that taking notes is a skill. Taking good notes requires thinking about the what you hear and see in the context of the lesson learning
outcomes as you listen and watch. Do not try to write down everything that is said. If you study the lesson before viewing the video you will know what topics to focus on as you watch, and you will know where to find them in the text. Some students find it useful to write notes in the margin of the text or study guide while watching.

Talk to the Instructor

The e-mail chat provides opportunities for one-on-one instruction. The instructor wants you to learn geology and is waiting to talk to you about the course and your learning, but he can only help you to the extent that you are involved. If you don't understand something, write to the instructor immediately. Don't wait until you have forgotten what you didn't understand.

Bulletin Board

There is a message board for student and instructor use at Laulima. You will need your University of Hawaii user name and login to access it.

GUIDELINES FOR SUCCESS

There are several specific things which will help you to learn about the earth through its geology. Keeping these things in mind as you study will help you to visualize and understand the concepts.

1. Think about how the course material relates to the real world. Geology is everywhere you look. Only you can make the course relevant to your experience. Observe what you learn in the world around you. Look at the mountains, the valleys, the beaches, the rocks, the sand. Visualize the processes you learn about and ask yourself questions.

2. View every class prepared, with enthusiasm and with the expectation of learning something new.

3. Set up a schedule for study and develop a study plan that works for you. Begin by following the study plan in the study guide.

4. Study the text. Pay special attention to the figures, diagrams, end-of-chapter questions and summaries. Spend quality study time free of distractions. Reading, reason, analyze, and answer questions from the text.

5. You can expect no more from this course than you put into it. If you expend no more than the minimum effort, you can expect no more than an average grade.

6. Don't wait until the day before the exam to study. Be prepared for exams and take them on time.

7. Explain to a friend or relative what you have learned and discuss it with them.

8. Study until you understand the material. Pay special attention to graphs, tables, and photographs.

9. Talk to the instructor if there is material you cannot understand after a reasonable amount of effort.

10. Write, write, write, and write some more...

WRITTEN ASSIGNMENTS

Except for the field trip report no written assignments are required. The course grade will be based
entirely on exam scores and report grade.

---

**EVALUATION**

Course grades will be determined from scores on exams and the field trip report (description below).

There will be four exams, one at the end of each of the four parts of the course. Each exam will cover the information in the lessons of each of the four parts.

Information on how to access the exams online will be sent to each student on the dates listed on the schedule.

The exams will require you to know facts, understand processes and relationships, and to make inferences from those facts. Many of the questions will expect you to make inferences.

You are responsible for initiating and completing the field report. Help is available. Just ask the instructor. There are also a few ideas in the Field Trip section below.

The final grade is based on 4 exams and the field trip report as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Pct</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>20%</td>
<td>200</td>
</tr>
<tr>
<td>Exam 2</td>
<td>20%</td>
<td>200</td>
</tr>
<tr>
<td>Exam 3</td>
<td>20%</td>
<td>200</td>
</tr>
<tr>
<td>Exam 4</td>
<td>20%</td>
<td>200</td>
</tr>
<tr>
<td>FT rpt</td>
<td>20%</td>
<td>200</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td>1000</td>
</tr>
</tbody>
</table>

Grade ranges are as follows:

- A: 85 to 100%
- B: 70 to 85%
- C: 55 to 70%
- D: 40 to 55%
- F: less than 40%
SELF-GUIDED FIELD TRIP

The required field trip and report are designed for you to experience geology in its natural setting and to apply what you have learned in the course to the real world.

Self-guided means you will choose some geological feature or area, observe it and report on some aspect of its geology. The report will describe the geologic feature you have chosen. It may be small scale, such as describing sand on a beach. It may be larger, such as Kilauea volcano. It might be the hillside you see from your kitchen window. The possibilities are limitless.

The report can be in any format. You can write (technically, prosaically or poetically), use film, videotape, drawings, or a web page. The requirements are that you actually observe that which you are writing about, that it demonstrate what you have learned and that it is presented in a thoughtful manner. Example of the types of features and questions to consider are listed at the end of this section. A typical report is three or four pages of text. The report is graded on three areas: field (does it convincingly establish that the report was not done entirely in the library?), content (are the descriptions and the geology plausible and feasible?), presentation (is the report thoughtfully and neatly presented?).

Here is a link to sample reports to give you an idea on how to proceed.

The report will be graded on the quality of your observations and the presentation, not on whether your interpretation is “correct”. You do not have to be right, but you should not be obviously wrong. Your observations should be consistent with the geology you have learned.

For example if you report finding a quartz sand beach in Hawaii, it will indicate that you have not understood the composition of Hawaiian rocks. If you suggest that you have observed metamorphic rocks it will indicate that you have not understood the concept of metamorphism.

The report should be brief but to the point, it should incorporate what you have learned, and it should convince me that you actually observed it firsthand. This is not a library report but you may consult references for background information. If you do use outside references they must be cited in a bibliography. You may consult with the instructor about the project if you like, by phone, by fax, in person, or by mail.

REFERENCES

There are a limited number of good references for Hawaiian geology. Most libraries and bookstores have copies. Your textbook can also be useful in characterizing general geologic features. A list of selected library references is available which may enhance your appreciation of geology and Earth.


Geology of the State of Hawaii, by Stearns (out of print but available in libraries)

Road Guide to Points of Geologic Interest in the Hawaiian Islands, by Stearns (also out of print but available in libraries)

Volcanic Features of Hawaii, by NASA
FIELD TRIP SUGGESTIONS

As you complete this course you will find that you see familiar features in a different light. You will also see things you hadn’t noticed before and you will begin to be aware of processes and how they operate. You will begin to wonder how this hill or that rock formed.

We expect that you will incorporate these new perspectives and insights in your report.

If you have trouble deciding on a topic, think about your favorite outdoor place. Or a hill that you saw as a child, a place you played, a place you went with your parents, a place you take your children.

Your report does not need to be a “professional” report. You need to demonstrate that you actually viewed or visited the place (as opposed to reading about it in the library), that you have applied something of what you have learned, and that you have put a reasonable amount of time and effort into presenting the report.

The instructor will assist you in choosing or limiting a topic, or with interpretations of the geology. But you must ask for help!

When you visit a place, the beach for example, look around as you walk. Look for rocks, look at the sand, watch the waves. Go to chapter 20 and look at the topics. Go to the library and locate books on beaches. The University of Hawaii library has many sources in various scientific journals which would be helpful. You may find many resources online. Use a search engine such as Yahoo to find references to your topic.

You do not have to study things that already have names, although there are descriptions of many such named features in the references above. You can find geology in your backyard or in the neighborhood park.

The following common features are suggestions for field trips on Oahu. They are suggestions only. You may choose one of these topics or a topic of your own. Use the questions below as guidelines for the kind of questions you might ask.

1. Diamond Head.
   - What is it made of?
   - Are the rocks like other rocks on Oahu?
   - What evidence is there that there has been significant erosion.
   - On Diamond Head road at the bottom of the hill between Waikiki and the lighthouse there are layers of sand underlying the Diamond Head tuff. How would you describe the structure of the sand? Why is the sand below the tuff?

2. Hanauma Bay/Koko Head/Koko Crater.
   - What kind of features are these? How were they formed?
   - Why is Koko crater much taller on one side than the other.
   - Look at Koko Crater from the lookout just off the road between Hawaii Kai and Hanauma Bay, and again from Sandy Beach, just past Halona Blowhole.
• Why is Hanauma Bay open to the sea? What is the origin of the flat bench near sea level which surrounds the bay?
• What are the green crystals in the sand on the north end of the beach?
• What are the white specks in the volcanic layers and where did they come from?

3. Beach Survey. Visit a beach or beaches in your area.

Spend a morning or afternoon watching the waves.

• Which direction do they come from?
• Do they break parallel to the shore?
• Take a small stick with you, put it in the water near shore and watch its motion.

Sample the sand at various locations along the beach, both up and down the beach and back from the shoreline. Here is a brief description of the components of typical Hawaiian beach sand.

• What is it made of?
• Are the sand grains the same size and composition everywhere on the beach?
• Is there a pattern to the differences?

Visit the same beach several times throughout the course.

• Do the waves always come from the same direction?
• Are they always the same size?

Look for a feature such as a large rock to use as a reference.

• Is the sand always in the same place and always the same thickness?

If you are "in" the course and are paying attention to the planet, you should have no trouble finding a geologic feature to visit. You will probably have a harder time deciding which one of several is best to choose. Consult with the instructor if you need direction or ideas. Try looking in the references listed above to see if the feature you have in mind has already been described. If it has you might use the published material as a point of departure. If it hasn't then you may want to choose another topic. If you feel adventurous, then use the published material as a model to see how geologic features are described, grab your hiking shoes and go discover some geology!
<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>&quot;Introduction&quot;</td>
</tr>
<tr>
<td>02</td>
<td>&quot;Down to Earth&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;The Restless Planet&quot;</td>
</tr>
<tr>
<td>03</td>
<td>&quot;Earth's Interior&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;The Sea Floor&quot;</td>
</tr>
<tr>
<td>04</td>
<td>&quot;The Birth of Theory&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Plate Dynamics&quot;</td>
</tr>
<tr>
<td>05</td>
<td>&quot;Mountain Building&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Earth's Structures&quot;</td>
</tr>
<tr>
<td>06</td>
<td>&quot;Earthquakes&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Tsunami&quot;</td>
</tr>
<tr>
<td>07</td>
<td>&quot;Geologic Time&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Evolution Through Time&quot;</td>
</tr>
<tr>
<td>08</td>
<td>&quot;Elements and Crystals&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Minerals: The Materials of Earth&quot;</td>
</tr>
<tr>
<td>09</td>
<td>&quot;Volcanism&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Volcanic Features&quot;</td>
</tr>
<tr>
<td>10</td>
<td>&quot;Intrusive Igneous Rocks&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Weathering and Soils&quot;</td>
</tr>
<tr>
<td>11</td>
<td>&quot;Mass Wasting&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Sedimentary Rocks&quot;</td>
</tr>
<tr>
<td>12</td>
<td>Metamorphic Rocks</td>
</tr>
<tr>
<td></td>
<td>&quot;Running Water, I&quot;</td>
</tr>
<tr>
<td>13</td>
<td>&quot;Running Water, II&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Ground Water&quot;</td>
</tr>
<tr>
<td>14</td>
<td>&quot;Wind, Dust, and Deserts&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Glaciers&quot;</td>
</tr>
<tr>
<td>15</td>
<td>&quot;Wave, Beaches, and Coasts&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Living With Earth, I&quot;</td>
</tr>
<tr>
<td>16</td>
<td>&quot;Living With Earth, II&quot;</td>
</tr>
</tbody>
</table>